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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,514	06/16/2006	Hyun-Tae Kim	11281-109-999	1424

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EXAMINER	
MCKINNON, TERRELL L	

ART UNIT	PAPER NUMBER
3744	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/583,514	KIM ET AL.	
	Examiner	Art Unit	
	TERRELL L. MCKINNON	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/14/2006, 6/9/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-9, 20-30, 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fries (US 4,108,239) in view of Arcella et al. (US 3,681,843).

Re. Cls. 1, 30, 32-33, Fries discloses A heat transfer device and method comprising, one end of which is contacted with a heat source and the other end of which is contacted with a heat emitting unit, the device transferring heat generated at the heat source to the heat emitting unit comprising:

a thermally-conductive flat case containing a working fluid that is evaporated with absorbing heat from the heat source and condensed with emitting heat to the heat emitting unit; and

a mesh aggregate installed in the case and configured so that coarse mesh and fine mesh in which wires are woven to be alternately crossed up and down are vertically laminated with being contacted with each other (col. 2; 26-32 and col. 3; 8-14 and col. 4; 4-16),

wherein the coarse mesh provides main-directional and sub-directional vapor dispersion channels with different sectional areas at each crossing point of mesh wires so that vapor evaporated from the working fluid is capable of flowing therethrough, the main- directional vapor dispersion channel with a relatively larger sectional area being parallel to a heat transfer direction, wherein the fine mesh provides liquid flow channels along a surface of the mesh wires (col. 1; 10-25 and col. 4, 4-16).

Re. Cls. 2-4, Fries discloses, based on engineering optimizations, an opening width of the coarse mesh is capable of being between 0.19 to 2.0 mm; the coarse mesh

is capable of having a wire diameter of 0.17 to 0.5 mm; and coarse mesh has an opening area of 0.036 to 4.0 mm^2 (col. 3; 50-58).

Re. Cls. 20-23, Fries discloses a wick structure installed in contact with the mesh aggregate and located under the mesh aggregate within the case, the wick structure having unevenness on a surface so that the working fluid is contained and flowed therein and at the same time evaporated by means of heat absorbed from the heat source and flowed toward the mesh aggregate (col. 4; 25-31).

21. the wick structure is formed by sintered copper, stainless steel, or nickel powder, very obvious selections of materials based on the state of the art of thermal exchange devices.

22. the wick structure is formed by etching polymer, silicon, silica, copper, stainless steel, nickel, or aluminum plate, very obvious selections of materials based on the state of the art of thermal exchange devices.

23. the case is made of electrolytic copper foil so that an inner surface having prominence and depression is used as the wick structure.

Re. Cls. 24-29, Fries discloses the ability of the heat exchange device to have the mesh is made of metal, polymer, or plastic (col. 4; 5-15).

25. the metal is copper, aluminum, stainless steel, molybdenum, or their alloy, very obvious selections of materials based on the state of the art of thermal exchange devices.

26. the case is made of metal, polymer, or plastic, very obvious selections of materials based on the state of the art of thermal exchange devices.

27. the metal is copper, aluminum, stainless steel, molybdenum, or their alloy, very obvious selections of materials based on the state of the art of thermal exchange devices.

28. the working fluid is water, ethanol, ammonia, methanol, nitrogen, or Freon (col. 3; 59-65).

29. an amount of filled working fluid is 80 to 150% of wick porosity (col. 3; 8-29).

Fries's invention fails to disclose the coarse mesh has a mesh number from 10 to 60; an opening width of the fine mesh is 0.019 to 0.18 mm; the fine mesh has a wire diameter of 0.02 to 0.16 mm; the fine mesh has an opening area of 0.00036 to 0.0324 mm^2; the fine mesh has a mesh number from 80 to 400.

However, Arcella teaches coarse mesh has a mesh number from 10 to 60; an opening width of the fine mesh is 0.019 to 0.18 mm; the fine mesh has a wire diameter of 0.02 to 0.16 mm; the fine mesh has an opening area of 0.00036 to 0.0324 mm^2; the fine mesh has a mesh number from 80 to 400 (Col. 1; 35-39 and Col. 3; 60-65).

Given the teachings of Arcella, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the heat exchanging device of Fries with coarse mesh has a mesh number from 10 to 60; an opening width of the fine mesh is 0.019 to 0.18 mm; the fine mesh has a wire diameter of 0.02 to 0.16 mm; the fine mesh has an opening area of 0.00036 to 0.0324 mm^2; the fine mesh has a mesh number from 80 to 400 .

Doing so would provide the appropriate size wicking members to effectively perform the heat exchanging given requirements.

5. Claims 10, 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fries (US 4,108,239) in view of Arcella et al. (US 3,681,843).as applied to claims above, and further in view of Trent (US 3,576,210).

Fries's invention as modified by Arcella, discloses all of the claimed limitations from above except for the mesh aggregate is configured to include the fine mesh arranged adjacent to the heat source and the coarse mesh laminated thereon adjacent to the heat emitting unit, from bottom to top; and the working fluid is evaporated into a vapor by means of heat absorbed from the heat source, wherein the coarse mesh is arranged in contact with the fine mesh so as to give a channel for the vapor to flow, wherein the intermediate mesh is arranged in contact with the coarse mesh and adjacent to the heat emitting unit so that the vapor is condensed with emitting heat to the heat emitting unit.

However, Trent teaches the mesh aggregate is configured to include the fine mesh arranged adjacent to the heat source and the coarse mesh laminated thereon adjacent to the heat emitting unit, from bottom to top; and the working fluid is evaporated into a vapor by means of heat absorbed from the heat source, wherein the coarse mesh is arranged in contact with the fine mesh so as to give a channel for the vapor to flow, wherein the intermediate mesh is arranged in contact with the coarse

mesh and adjacent to the heat emitting unit so that the vapor is condensed with emitting heat to the heat emitting unit (Fig. 1; col. 2; 41-47).

Given the teachings of Trent, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the heat exchanging device of Fries with the mesh aggregate is configured to include the fine mesh arranged adjacent to the heat source and the coarse mesh laminated thereon adjacent to the heat emitting unit, from bottom to top; and the working fluid is evaporated into a vapor by means of heat absorbed from the heat source, wherein the coarse mesh is arranged in contact with the fine mesh so as to give a channel for the vapor to flow, wherein the intermediate mesh is arranged in contact with the coarse mesh and adjacent to the heat emitting unit so that the vapor is condensed with emitting heat to the heat emitting unit.

Doing so would provide a wick arrangement for efficient providing capillary action for removing heat from the heat generating devices.

6. Claims 11-16, 19 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fries (US 4,108,239) in view of Arcella et al. (US 3,681,843).and Trent (US 3,576,210) as applied to claims above, and further in view of Rosenfield et al. (US 5,076,352).

Fries's invention as modified by Arcella and Trent, discloses all of the claimed limitations from above except for the mesh aggregate is configured so that the coarse mesh is interposed between two layers of fine meshes; at least one layer of additional fine mesh is provided in at least a part of the coarse mesh interposed between the fine

meshes so as to give a liquid channel by interconnecting the fine meshes; wherein the mesh aggregate further includes at least one layer of intermediate mesh whose mesh number is relatively larger than that of the coarse mesh and relatively smaller than that of the fine mesh; the coarse mesh is laminated between the fine mesh and the intermediate mesh; at least one layer of additional fine mesh is provided in at least a part of the coarse mesh interposed between the fine mesh and the intermediate mesh so as to give a channel by interconnecting the fine mesh and the intermediate mesh; at least one layer of additional intermediate mesh is provided in at least a part of the coarse mesh interposed between the fine mesh and the intermediate mesh so as to give a channel by interconnecting the fine mesh and the intermediate mesh; wherein the intermediate mesh has a vapor flow space so that the vapor introduced from the coarse mesh flows therein.

However, Rosenfield teaches a multi-wick structure configured so that the coarse mesh is interposed between two layers of fine meshes (Figs. 1 and 2); at least one layer of additional fine mesh is provided in at least a part of the coarse mesh interposed between the fine meshes so as to give a liquid channel by interconnecting the fine meshes; wherein the mesh aggregate further includes at least one layer of intermediate mesh whose mesh number is relatively larger than that of the coarse mesh and relatively smaller than that of the fine mesh; the coarse mesh is laminated between the fine mesh and the intermediate mesh; at least one layer of additional fine mesh is provided in at least a part of the coarse mesh interposed between the fine mesh and the intermediate mesh so as to give a channel by interconnecting the fine mesh and the

intermediate mesh; at least one layer of additional intermediate mesh is provided in at least a part of the coarse mesh interposed between the fine mesh and the intermediate mesh so as to give a channel by interconnecting the fine mesh and the intermediate mesh; wherein the intermediate mesh has a vapor flow space so that the vapor introduced from the coarse mesh flows therein (Fig. 1; Col. 3; 20-26 and Col. 4; 11-19).

Given the teachings of Rosenfield, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the heat exchanging device of Fries with the coarse mesh is interposed between two layers of fine meshes; at least one layer of additional fine mesh is provided in at least a part of the coarse mesh interposed between the fine meshes so as to give a liquid channel by interconnecting the fine meshes; wherein the mesh aggregate further includes at least one layer of intermediate mesh whose mesh number is relatively larger than that of the coarse mesh and relatively smaller than that of the fine mesh; the coarse mesh is laminated between the fine mesh and the intermediate mesh; at least one layer of additional fine mesh is provided in at least a part of the coarse mesh interposed between the fine mesh and the intermediate mesh so as to give a channel by interconnecting the fine mesh and the intermediate mesh; at least one layer of additional intermediate mesh is provided in at least a part of the coarse mesh interposed between the fine mesh and the intermediate mesh so as to give a channel by interconnecting the fine mesh and the intermediate mesh; wherein the intermediate mesh has a vapor flow space so that the vapor introduced from the coarse mesh flows therein.

Doing so would provide multiple wick arrangements for efficient providing capillary action for removing heat from the heat generating devices.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references cited on the PTO892 discloses related limitations of the applicant's claimed and disclosed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TERRELL L. MCKINNON whose telephone number is (571)272-4797. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

March 14, 2010
/Terrell L Mckinnon/
Primary Examiner, Art Unit 3744